



THE UNIVERSITY OF KANSAS HEALTH SYSTEM

Concussion Tool Time

Workers Compensation Seminar
9/29/21

Michael Rippee, MD
Associate Professor
Sports Neurologist
Department of Neurology
Medical Director, Center for Concussion Management



@MichaelRippee

Objectives

- Understand the basic mechanism and pathophysiology of concussion
- Recognize tools for the toolbox to diagnose concussion
- Recognize treatment options to treat concussion
- Discuss the need for work restrictions in those with concussion and the “why”

Definition

- Zurich Conference
 - Concussion is defined as a complex patho-physiological process affecting the brain, induced by traumatic biomechanical forces.
- American Academy of Neurology
 - a clinical syndrome of biomechanically induced alteration of brain function, typically affecting memory and orientation, which may involve loss of consciousness



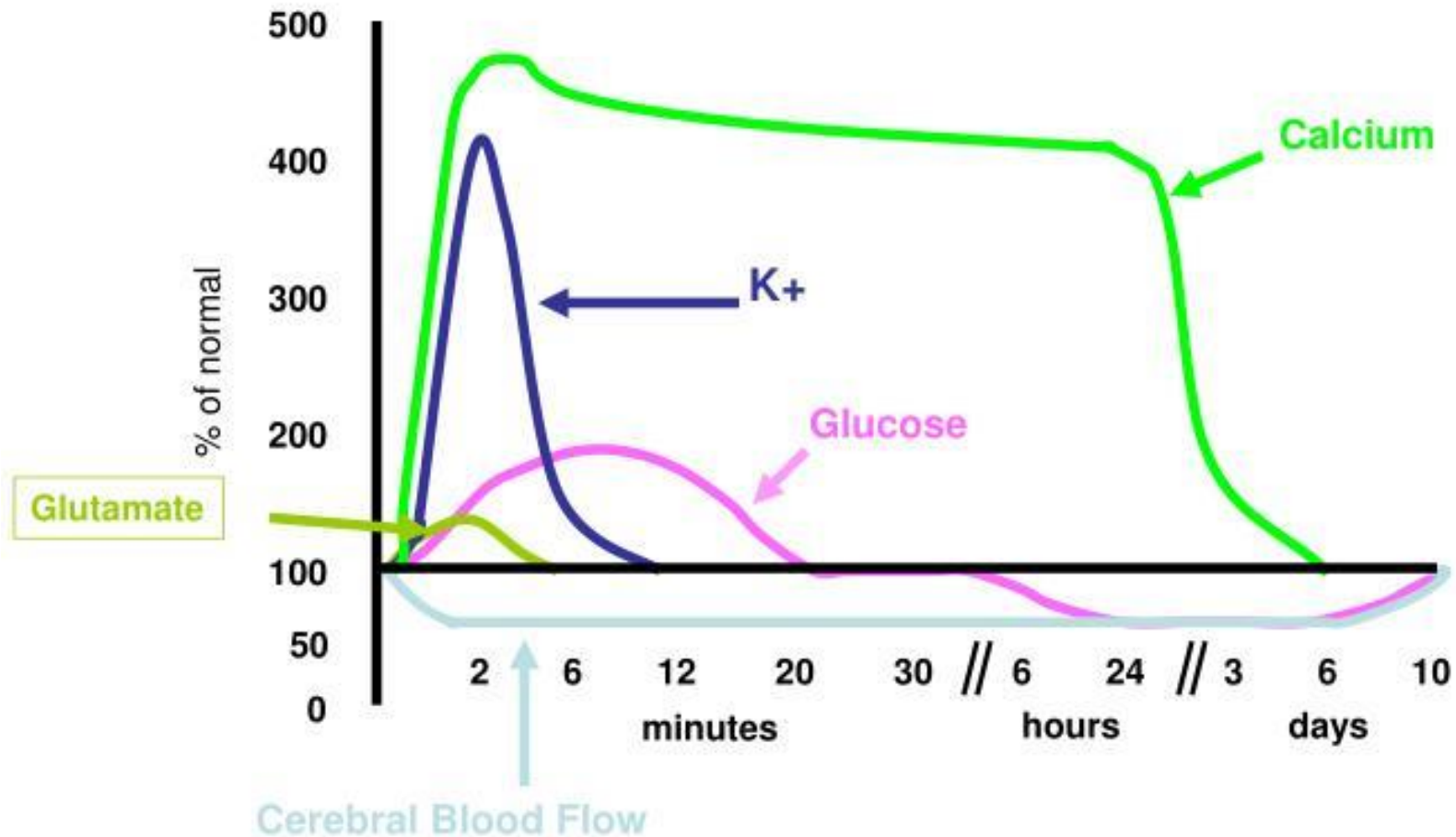
What is a Concussion?

- A type of brain injury that changes the way the brain normally works
- Caused by a bump, blow, or jolt to the head or body
- AKA
 - Mild TBI
 - Mild Brain Trauma
 - Mild Closed Head Injury
 - Minor Head Trauma
- Does not require loss of consciousness
- There is no grading scale



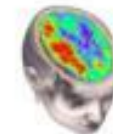
Neurometabolic Cascade Following Cerebral Concussion/MTBI

(Giza & Hovda, 2001)



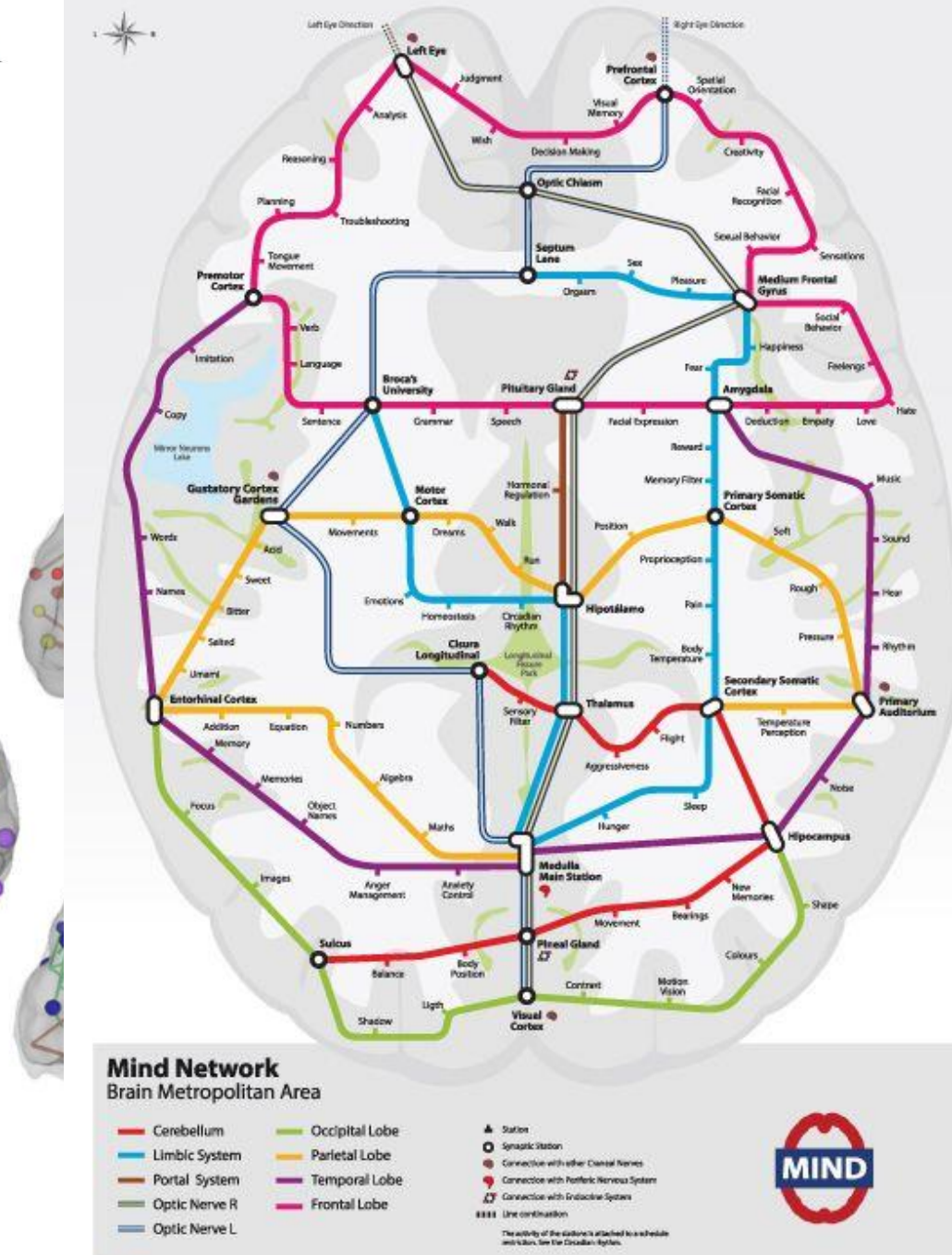
End result:

1. Energy crisis
2. Impaired communication
3. Decreased blood flow
4. Damaged cell walls



What is a Concussion?

- Network process



Why underdiagnosed/misdiagnosed

- Relies mostly on patient symptom report
- Not all patients seek care immediately
- Symptoms are vague
- Co-morbid conditions
- No specific test for diagnosis or recovery



Concussion Symptoms & Complaints

- Headache or “pressure” in head
- Nausea and/or vomiting
- Balance problems or dizziness
- Confusion
- Concentration or memory issues
- Double or blurry vision
- Sensitivity to light/noise
- Feeling sluggish, hazy, foggy
- Feeling more emotional, nervous or anxious
- Does not ‘feel right’
- Feels detached, numb from surroundings
- Loses consciousness or groggy

Office Assessment of Concussion

NEUROLOGICAL EXAM

MENTAL STATUS EXAM (see other side)

CRANIAL NERVES

I, OLFACTORY – smell

II, OPTIC – visual acuity / fields and fundoscopic exam of each eye

III, IV, VI; OCULOMOTOR, TROCHLEAR, ABDUCENS – eyelid opening; extracocular movements (IV, superior oblique; VI, lateral rectus; III, all others); direct and consensual pupillary light reflexes

V, TRIGEMINAL (V1, ophthalmic; V2, maxillary; V3, mandibular) – corneal reflex, facial sensation, jaw opening, bite strength

VII, FACIAL – eyebrow raise, eyelid close, smile, frown, pucker, taste

VIII, VESTIBULOCOCHLEAR – auditory acuity of each ear, Rinne (air v. bone conduction) and Weber (lateralizing) tests, oculocephalic reflex (doll's eye maneuver), oculovestibular reflex (ear canal caloric stimulation)

IX, X; GLOSSOPHARYNGEAL, VAGUS – palate elevation, swallowing, posterior taste, phonation, gag reflex

XI, SPINAL ACCESSORY – lateral head rotation, neck flexion, shoulder shrug

XII, HYPOGLOSSAL – tongue protrusion and strength on lateral deviation

SENSATION

Test and contralaterally compare pain / temperature, vibratory, and proprioceptive (Romberg test, joint position) sensation; stereognosis; graphaesthesia; and two point discrimination.

STRENGTH

Test and contralaterally compare extremity muscle groups listed with the dermatome maps.

Grading: 5/5 - Movement against gravity with full resistance
4/5 - Movement against gravity with some resistance
3/5 - Movement against gravity only
2/5 - Movement with gravity eliminated
1/5 - Visible / palpable muscle contraction but no movement
0/5 - No contraction

REFLEXES

Test and contralaterally compare triceps (C7, radial n.), biceps (C5, musculocutaneous n.), brachioradialis (C6, radial n.), patellar (L4, femoral n.), Achilles (S1, tibial n.) and Babinski sign.

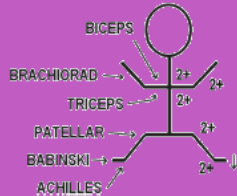
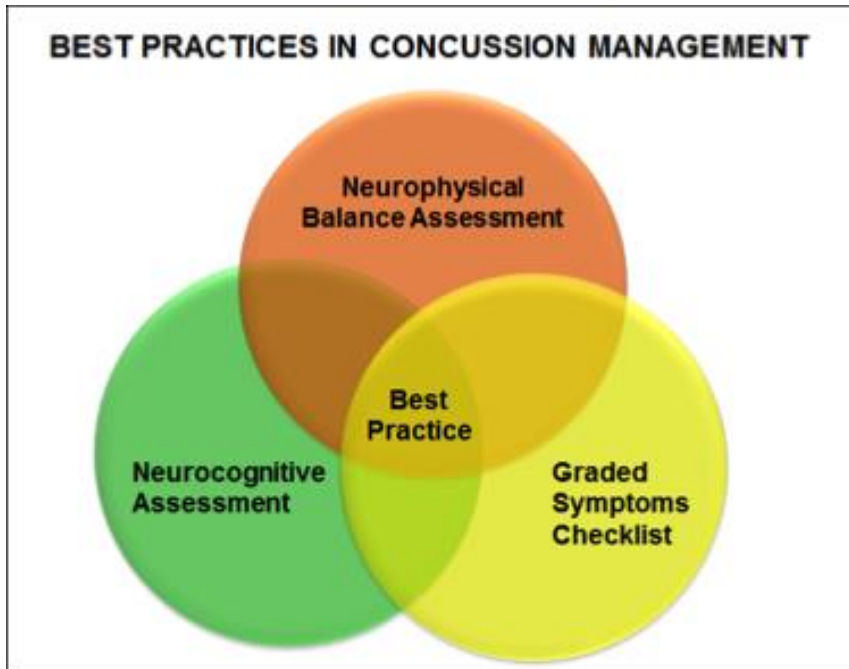
Grading: 4+ - Hyperactive with clonus
3+ - Hyperactive
2+ - Normal
1+ - Hypoactive
0 - No reflex

CEREBELLUM

Test finger-to-nose, heel-to-shin, and rapid alternating hand movements.

GAIT

Test tandem gait, walking on heels and toes.

Office Assessment of Concussion

THE UNIVERSITY OF KANSAS HOSPITAL 3901 Rainbow Boulevard Kansas City, Kansas 66160 Center for Concussion Management CONCUSSION SYMPTOMS CHECKLIST	Do NOT Scan	Name: _____ DOB: _____ MR#: _____
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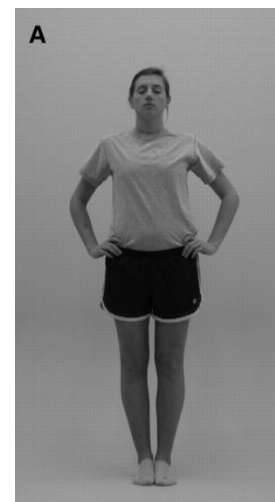
PATIENT NAME: _____
 Today's Date: _____
 Date of Injury: _____

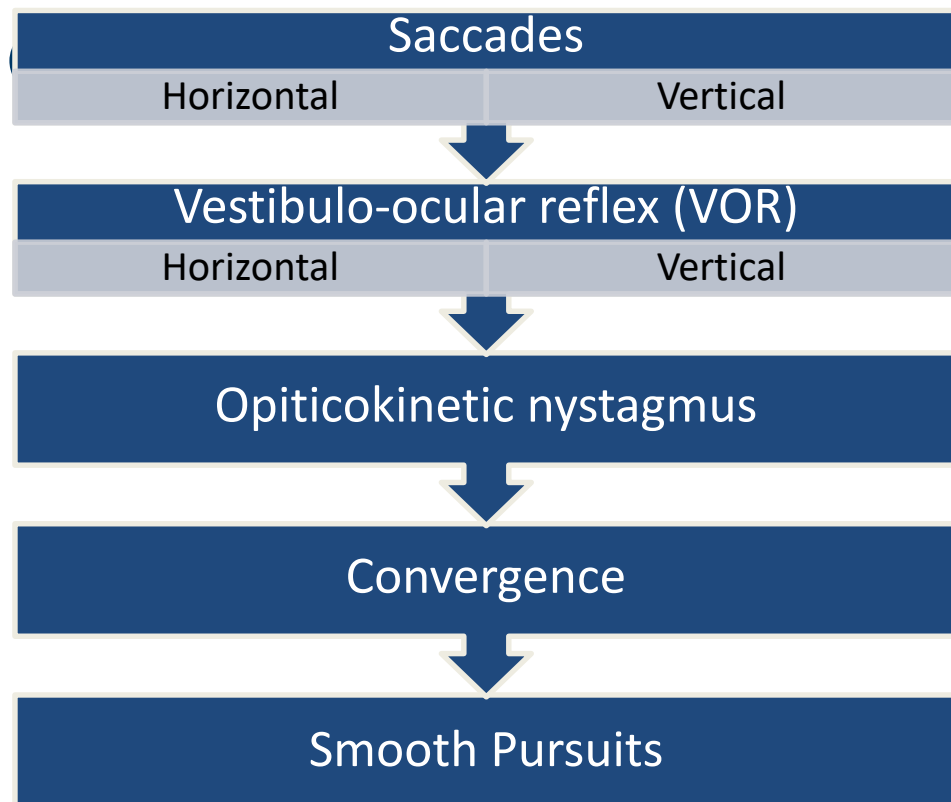
SCORE YOURSELF ON THE FOLLOWING SYMPTOMS (based on how you feel now):

Symptom	None	Mild	Mild	Moderate	Moderate	Severe	Severe
Score	0	1	2	3	4	5	6
Headache							
"Pressure in head"							
Neck pain							
Nausea or vomiting							
Dizziness							
Blurred Vision							
Balance Problems							
Sensitivity to light							
Sensitivity to noise							
Feeling slowed down							
Feeling like "in a fog"							
"Don't feel right"							
Difficulty concentrating							
Difficulty remembering							
Fatigue or low energy							
Confusion							
Drowsiness							
Trouble falling asleep							
More emotional							
Irritability							
Sadness							
Nervous or anxious							
Column Totals							

TOTAL NUMBER OF SYMPTOMS: (add all scores in table, max possible 22 x 6= 132)

Do the symptoms get worse with physical activity? ☐ Y ☐ N
 Do the symptoms get worse with mental activity? ☐ Y ☐ N

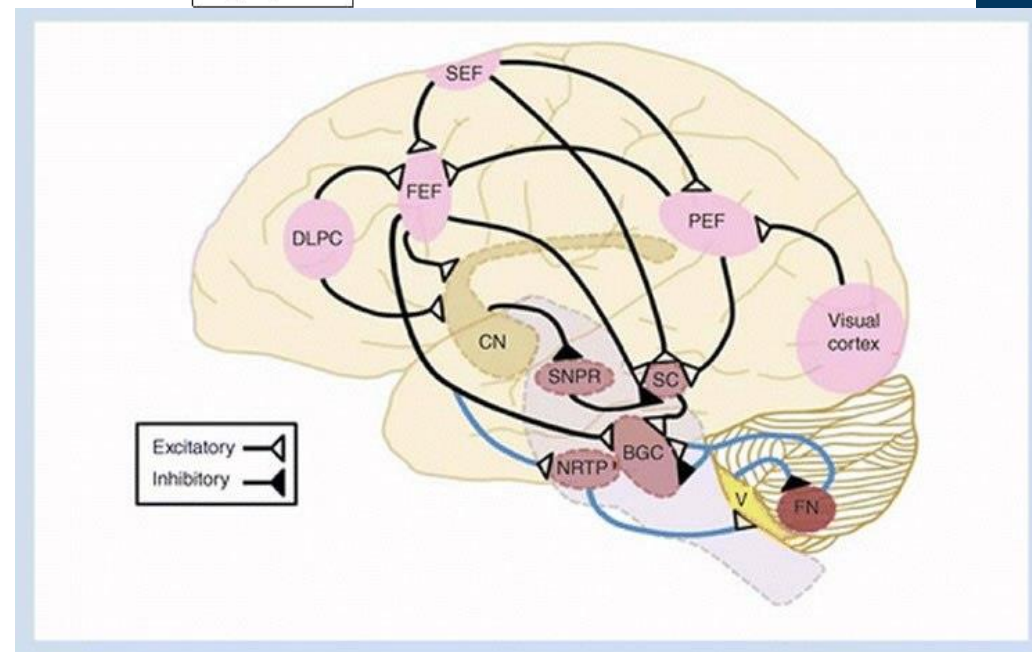
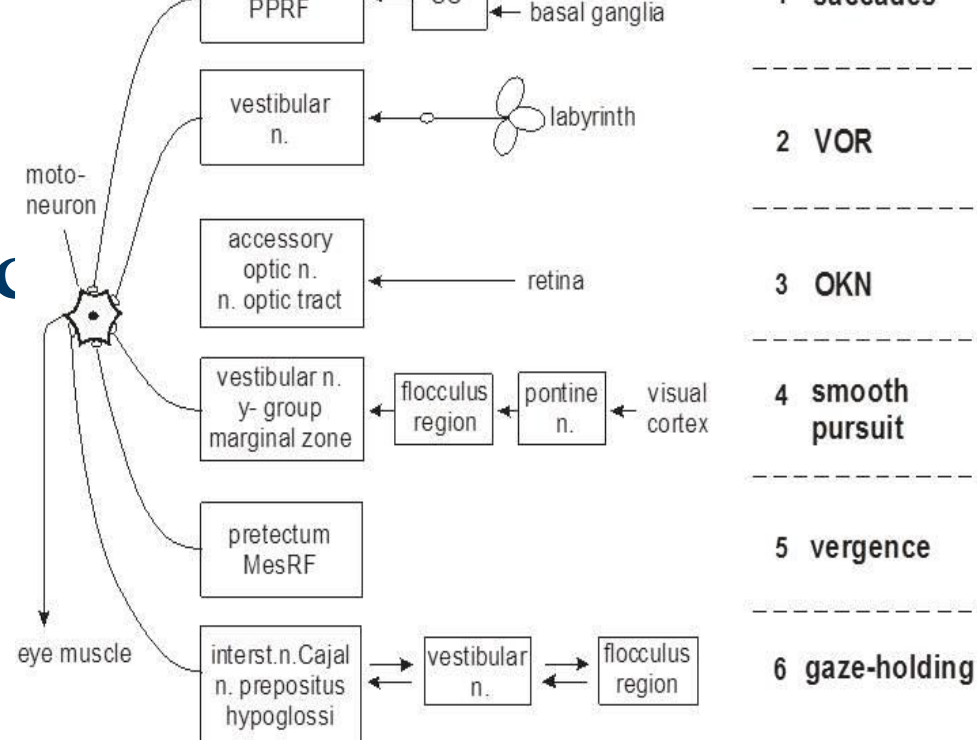




Vestibular/Ocular-Motor Screening (VOMS) for Concussion

Vestibular/Ocular Motor Test:	Not Tested	Headache 0-10	Dizziness 0-10	Nausea 0-10	Fogginess 0-10	Comments
BASELINE SYMPTOMS:	N/A					
Smooth Pursuits						
Saccades – Horizontal						
Saccades – Vertical						
Convergence (Near Point)						(Near Point in cm): Measure 1: _____ Measure 2: _____ Measure 3: _____
VOR – Horizontal						
VOR – Vertical						
Visual Motion Sensitivity Test						

onc



Office Assessment of Concussion

Bedside Cognitive Testing

Immediate recall	Say 5 words and have patient repeat them back
Concentration	Reverse string of digits
Delayed recall	Recite 5 words from previous



Dec-Nov-Oct-Sept-Aug-Jul-Jun-May-April-Mar-Feb-Jan

Elbow	4-9-3
Apple	3-8-1-4
Carpet	6-2-9-7-1
Saddle	7-1-8-4-6-2
Bubble	



Multimodal Assessment of Sport-Related Concussion

Sherry, Natalie Sandel, PsyD^{*,†}; Fazio-Sumrok, Vanessa, PhD^{*,†}; Sufrinko, Alicia, PhD^{*,†}; Collins, Michael W., PhD^{*,†}; Kontos, Anthony P., PhD^{*,†}

Clinical Journal of Sport Medicine: March 18, 2019 - Volume Publish Ahead of Print - Issue - p
doi: 10.1097/JSM.0000000000000740
Original Research: PDF Only

- “Elements within a multimodal evaluation that are the most robust at discriminating athletes with SRC from healthy controls in the acute/early subacute phase of injury include symptom report and provocation of symptoms on vestibular/oculomotor assessment”

Concussion Technology

- Ideal
 - Portable Rapid Non-Invasive Objective Assessment
- Concussion Technology
 - Event Detection
 - Clinical Diagnostic Assessment
 - Biomarkers
 - Prevention
 - Symptom Treatment



Clinical Diagnostics



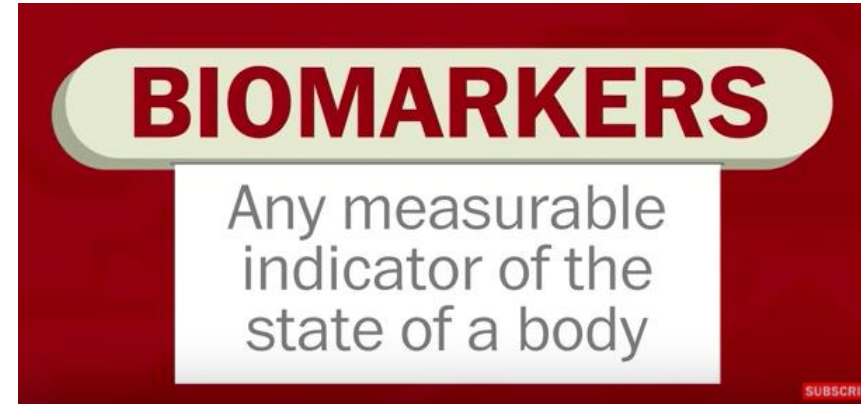
Concussion Biomarkers

- Potential impacts
 - Sideline diagnosis
 - Injury resolution
 - Delineate PCS from misattributed symptoms

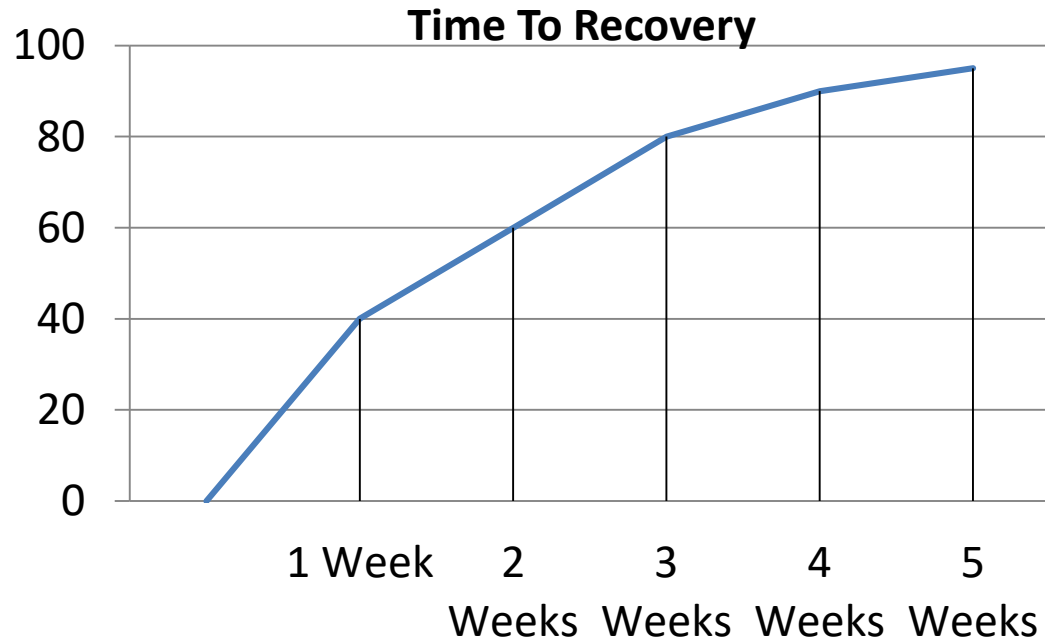
FDA News Release

FDA authorizes marketing of first blood test to aid in the evaluation of concussion in adults

New quick testing option to help reduce need for CT scans, radiation exposure for patients



Management of Concussion



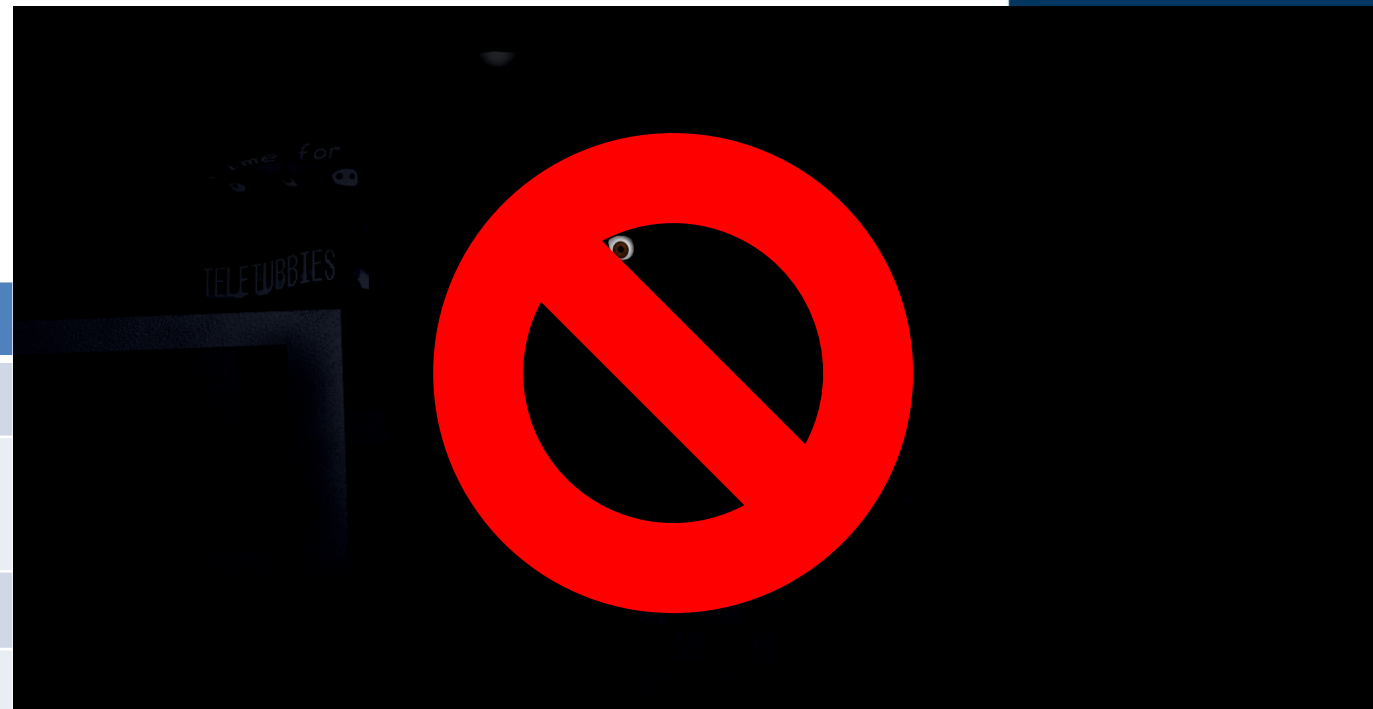
COGNITIVE REST!!!!

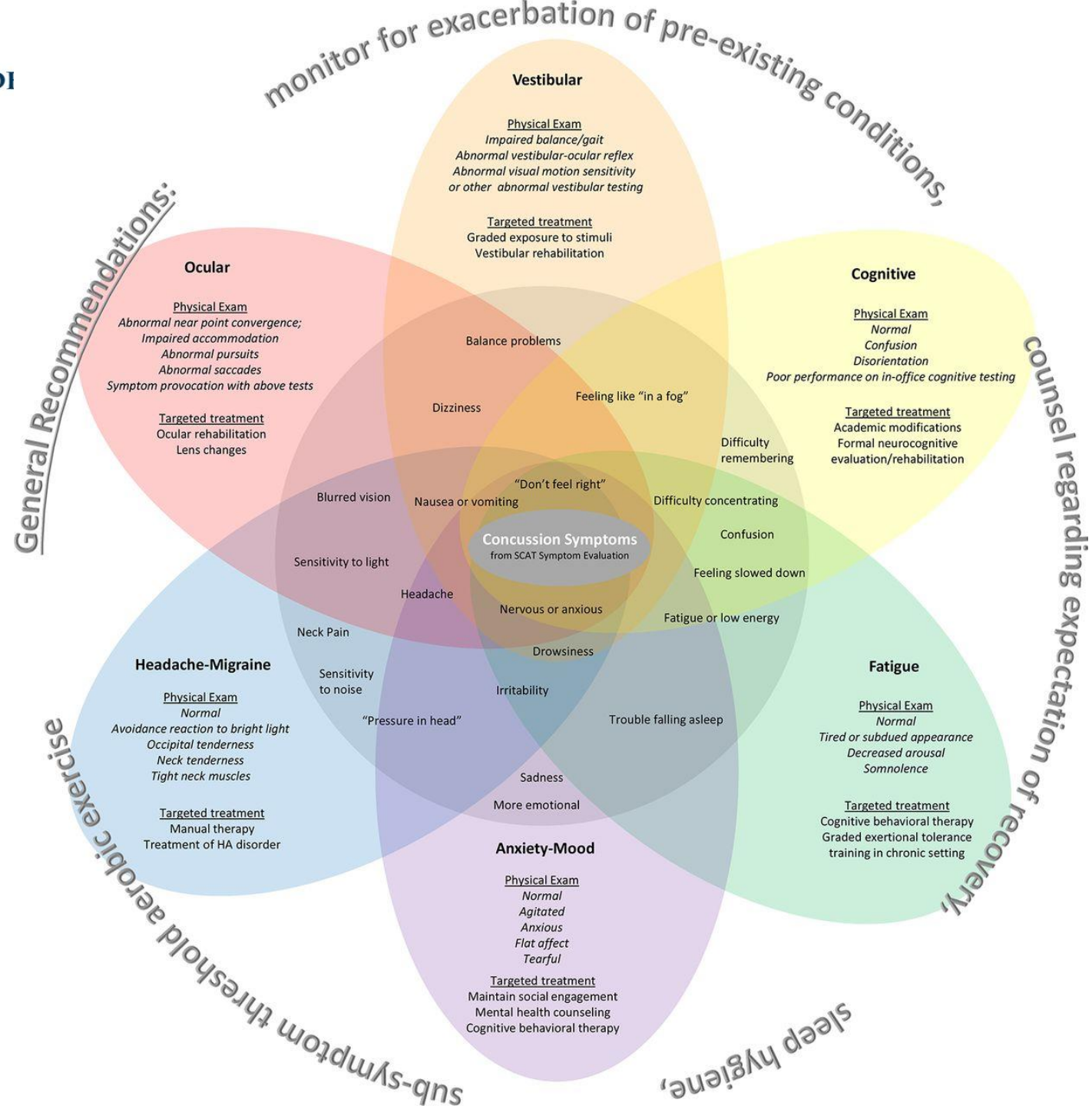
Limited screens (phones, TV, movies, etc)

Avoid noisy, bright, overstimulating places (concerts, sports, etc)

School/Work Accommodations

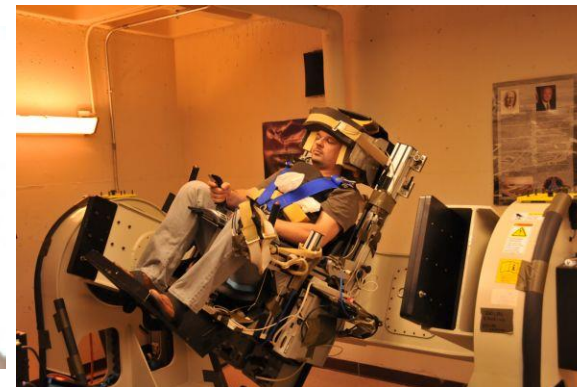
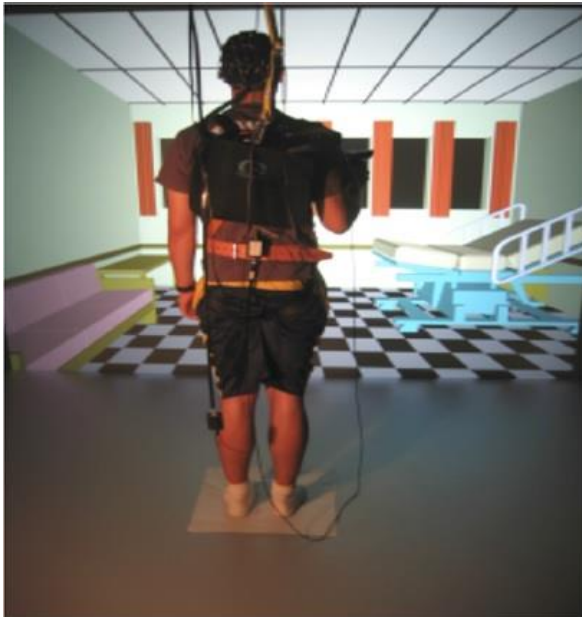
Regular sleep cycle





Symptom Treatment

BRAIN STATE
TECHNOLOGIES®
The Leading System for Brainwave Optimization with RTB™



Work Considerations

- Safety
 - Visual/Vestibular, Dizziness, Slowed cognitive processing/reaction time
 - Falls, machinery, heights/ladders/climbing, bending, driving
- Symptom burden
 - Noise/lights, computers, cognitive/physical exertion, repetitive motion (head/eyes), neck
 - Stamina
 - Do symptoms worsen
- Cognitive AND physical

SAFETY AT THE WORKPLACE



Work accommodations

- Reduced hours
- Frequent breaks
- Reduced computer
- No climbing
- Noise/light reduction
- No repetitive bending
- Sedentary duty
- Weight restrictions

Questions?

